

**A New Subgenus and Species of Matinal *Andrena*
from the Flowers of *Sicyos* (Cucurbitaceae)
in Mexico**
(Hymenoptera : Apoidea)

WALLACE E. LABERGE AND PAUL D. HURD, JR.

University of Nebraska, Lincoln and University of California, Berkeley

Although the squash and gourd bees of the genera *Peponapis* and *Xenoglossa* (Hurd and Linsley, 1964) are the only known bees in the Americas whose females obtain their pollen solely from the Cucurbitaceae (genus *Cucurbita*), a few other species of bees may ultimately be shown to be similarly restricted to the pollen of certain other Cucurbitaceae. Among this latter group is a new species of *Andrena* from the Valley of Mexico which represents a new subgenus and whose observed behavior at the pollen source suggests that it may be oligolectic on the cucurbit genus *Sicyos*. The activity pattern of these bees at the flowers of *Sicyos deppei* also indicates that it is a matinal bee which appears to be closely synchronous with the early morning flowering of this cucurbit. Like the oligolectic evening primrose bees of the subgenus *Onagrandrena*, the new species is chiefly black in coloration and bears a striking similarity to certain matinal species of that unrelated subgenus of *Andrena*.

The study site, situated some 3 kms south of Chapingo in the Valley of Mexico was first visited in the late forenoon (11:30–12:00) of 30 July 1962. Here the vines of this cucurbit were growing rampant over the roadside shoulders and ditches. A few of the vines had climbed 10 or more feet into the pepper trees (*Schinus molle*) which lined that side of the road. The small and rather inconspicuous white flowers, often hidden from view by the dense foliage of the vines, were numerous and were being visited by large numbers of syrphid flies and a few halictine bees. Examination of the flowers revealed that although nectar was abundant most of the available pollen had been removed. On the following day the site was revisited shortly before 10:00 a.m. and within a 15-minute period four males and five females of the new *Andrena* were collected from those flowers chiefly shaded from direct sunlight or nearly obscured by the leaves of the vines. Syrphid flies and a few other bees including a very dark colored *Colletes* were also collected. Observation of the *Andrena* females before collection from the flowers indicated that they were in quest of nectar. As on the preceding day most of the available pollen had already been removed from the flowers. The site was again

revisited on 3 August shortly after 9:00 a.m. At the outset of the ensuing one-half hour period of observation many males and females of the new *Andrena* were in evidence especially at the flowers that were protected by the foliage from direct rays of the sun. All of the females were actively gathering the remaining pollen while the males coursed through the foliage of the vines. Several males were observed to copulate with the pollen gathering females on the flowers. In two instances copulating pairs dropped from the flower to a leaf before separation. By 9:30 a.m. there were noticeably fewer females and none were observed to collect pollen. The numbers of males also declined so that in the last 15 minutes of observation (9:30 to 9:45) only a few individuals of either sex were evident. Like those bees seen at about the same time on 31 July these males and females were seeking nectar chiefly from those flowers most protected from the direct rays of the sun.

On 4 August the site was revisited for the last time. Upon arrival at 7:10 a.m. the sun had just cleared the horizon and was not yet shining on the *Sicyos* vines. None of the flowers had opened nor did they begin to open until the more exposed flowers received direct sunshine at 7:30 a.m. Unfortunately air temperatures during the period of study (7:10 a.m. to 9:00 a.m.) are unknown, but at the outset jackets were required for comfort. Shortly before 8:05 a.m., when the first female *Andrena* was seen with a partly completed pollen load, a large number of flowers were open and many other flowers were in various stages of opening. During the next half hour all the flowers that were to bloom that day had opened and the numbers of *Andrena*, particularly the pollen gathering females, became increasingly abundant. The largest numbers of females were observed collecting pollen between 8:30 a.m. and 9:00 a.m. when a large roadside herd of cattle forced an abrupt departure.

The foregoing observations, while somewhat fragmentary and extending over several days, seem to demonstrate that the new species of *Andrena* is a matinal species rather closely synchronized with the flowering characteristics of its pollen source, *Sicyos deppei*. Since the pollen of that plant is available for collection when the flowers open, the period of maximum pollen gathering by the *Andrena* females appears to coincide with the main opening of the flowers (maximum pollen available) rather than before that period or after it. At least at that locality large numbers of syrphids are attracted to the nectar of this plant, but these do not arrive at the flowers until towards the end of the activity of the *Andrena* which is the first insect to arrive at

the flowers in the morning. Possibly the later arrival of the syrphids and some other bees also in quest of nectar may be occasioned by the higher temperatures prevailing near the end of the activity of the *Andrena*. It is not clear from these studies whether the chiefly black colored *Colletes*, which was observed in low numbers near the end or after the activity of the *Andrena* ceased, is seeking nectar, pollen, or both.

According to Dr. Thomas W. Whitaker the genus *Sicyos* consists of about 30 species, all New World in occurrence, and appears to be one of the most hardy, if not the hardiest of the Cucurbitaceae. One of the species in the eastern United States is called the "Bur Cucumber" and Dr. Whitaker comments that none of the species are of known economic use.

The description which follows describes this *Andrena* as a new species and new subgenus and is based upon 32 specimens (11 males and 21 females). We wish to acknowledge the field assistance of Professor Ray F. Smith, University of California, Berkeley, Dr. Astrid Løken of the Zoological Museum, University of Bergen, Norway, and Mr. John K. Drew, formerly a graduate student in the Department of Entomology and Parasitology, University of California, Berkeley. We are also indebted to Dr. Thomas W. Whitaker, Geneticist, U.S.D.A. Horticultural Field Station, La Jolla, California for the identification of *Sicyos deppei* and for information concerning this genus of Cucurbitaceae. Professor E. Gorton Linsley, University of California, Berkeley has our thanks for a critical and helpful review of the manuscript. This study is one of a series of studies made possible by a grant from the National Science Foundation (NSF GB-1021, "Insect pollinators of the Cucurbitaceae").

Celetandrena LaBerge and Hurd, new subgenus

Type species.—*Andrena vinnula*, new species.

Celetandrena is a monotypic subgenus from México which is distinctive in that the females lack the subgenal coronets. Several species of *Callandrena* also lack the subgenal coronets in the females, but these may be readily distinguished from the females of *Celetandrena* by the lack of humeral angles on the pronotum, the short maxillary palpi, and the usually broadened middle basitarsi. The female of *Celetandrena* is referred to either *Leucandrena* or *Onagrاندrena* in the key to subgenera of *Andrena* published by LaBerge (1964, p. 285, couplet 23). *Celetandrena* females may be distinguished from females of either *Leucandrena* or *Onagrاندrena* by the lack of subgenal coronets.

The male of *Celetandrena* is less distinctive than the female. In LaBerge's key (*op. cit.*, p. 290, couplet 24) the male is referred to

Andrena s. str. or to *Onagrاندrena*. The males of *Celetاندrena* are like those of *Andrena s. str.* in the presence of pronotal humeral angles, the broad head and genal areas, and the wing venation. They are unlike most *Andrena s. str.* and unlike *Onagrاندrena* in possessing yellow clypei. They also differ from the *Onagrاندrena* in the smoothly sculptured propodeal enclosure.

Medium-sized bees with vestiture chiefly black. Facial quadrangle distinctly broader than long; lateral ocellus separated from vertex by slightly more than one ocellar diameter; labial palpus normal; maxillary palpus normal, exceeding galea by about length of last three palpal segments; clypeus short, broad, protruding beyond ends of compound eyes by one-fourth median clypeal length or less; malar space linear; genal area in lateral view considerably broader than eye. Pronotum with humeral angle (weak in female), ridge extending down from humeral angle blunt, uninterrupted, often partially absent in female, groove behind ridge narrow, shallow; propodeum with dorsal surface smoothly rounded to posterior, almost completely declivous in males; enclosure of propodeum finely sculptured, lateral margins slightly concave. Tergal integument punctate, shiny. Hind tibial spurs normal. Pterostigma narrow, about as broad as from inner margin of prestigma to wing margin; first transverse cubital vein separated from pterostigma by several vein widths; vein 1st m-cu meeting second submarginal cell at about two-thirds distance from base of cell.

FEMALE.—Facial fovea broad, shallow, upper end occupying most of space between eye and lateral ocellus; labral process large, semicircular in outline, weakly, if at all, emarginate. Middle basitarsus not expanded medially. Subgenal coronets absent; tibial scopal hairs highly plumose throughout; trochanteral flocculus complete, hairs long and plumose; propodeal corbicula complete anteriorly, with several internal, plumose hairs.

MALE.—Clypeus yellow, parocular areas occasionally yellow; mandibles decussate; first flagellar segment subequal to or slightly longer than second segment. Sternum 6 with apex not reflexed, with broadly V-shaped apical emargination.

***Andrena (Celetاندrena) vinnula* LaBerge and Hurd, new species**

FEMALE.—*Measurements and ratios*: N = 20; length, 10.5–12.0 mm; width, 2.5–3.5 mm; wing length, M = 4.62 ± 0.119 mm; FL/FW, M = 0.89 ± 0.001 ; FOVL/FOVW, M = 2.80 ± 0.044 .

Integumental color: Integument black except as follows: eyes grey; wing membranes hyaline, moderately infumate; tarsal claws and tibial spurs rufescent.

Structure: Scape longer than flagellar segments 1–3; flagellar segment 1 equal in length to segments 2 plus 3, segment 2 slightly shorter than 3 and each shorter than segment 4. Eye almost four times as long as broad, inner margins converging slightly towards vertex. Malar space linear, eight times as long as broad. Mandibles bidentate, in repose outer mandible extends about one-fourth beyond middle of labrum; without ventrobasal lamella. Galea short, evenly curved from dorsum to sides, blunt, surface moderately shiny, with fine reticular shagreening. Maxillary palpus normal, segments in ratio of about 1.5 : 1.8 : 1.2 : 1.4 : 1.0 : 1.0. Labial palpus with first segment relatively short, curved slightly, not flattened, segments in ratio of about 1.8 : 1.0 : 1.0 : 1.0, last two segments attached to preceding segments subapically. Labral process large, flat, semi-

circular, with small median emargination usually present. Clypeus evenly rounded, short, protruding beyond eyes by about one-fourth its median length; punctures irregular, generally round, separated by one to two puncture widths, with indistinct, longitudinal, median, impunctate, raised area, surface dulled by reticular shagreening. Supraclypeal area minutely, indistinctly punctate, dulled by tessellation. Genal area distinctly broader than eye in profile (about as 5 : 4), with minute punctures separated mostly by two to three puncture widths, surface dulled by reticular shagreening except near eye margin. Vertex of moderate height, above lateral ocellus equals slightly more than one ocellar diameter; with minute indistinct punctures crowded above ocelli, sparse above foveae, surface dulled by fine tessellation. Face above antennal fossae with fine rugulae above (near ocelli), interrugal spaces with small punctures, surface moderately shiny, irregularly shagreened. Facial fovea occupying most of space between eye and ocellus, extending down to below lower margin of antennal fossa, shallow.

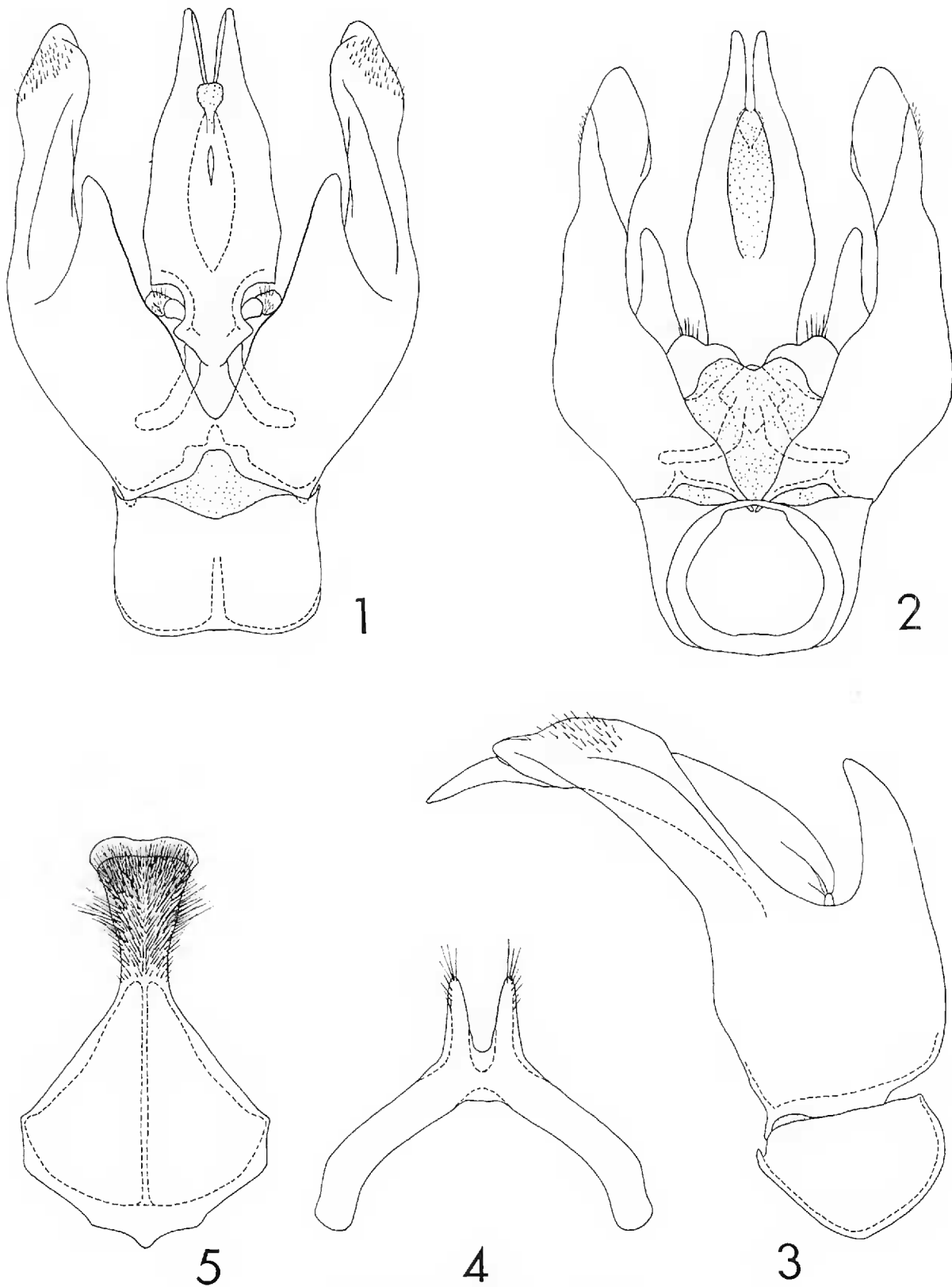
Pronotum with extremely weak, rounded humeral angles, dorsolateral ridge not evident above, weakly expressed below; surface dulled by coarse, reticular shagreening. Mesoscutum with round punctures of irregular size and spacing, separated mostly by one-half to two puncture widths, surface moderately dulled by coarse reticular shagreening. Tegulae shiny, impunctate. Scutellum similar to mesoscutum but punctures more crowded along midline and shagreening weak. Metanotum with minute punctures and tessellation dulling surface. Propodeum with dorsal enclosure with sides curved slightly inwards, finely sculptured, tessellate except slightly more roughened near base; dorsolateral and posterior surfaces with minute round punctures separated mostly by one puncture width, surface dulled by fine reticular shagreening; corbicular surface with scattered punctures, moderately shiny, coarsely shagreened. Mesepisternum opaque, with minute indistinct punctures and dense tessellation. Metepisternum below similar to corbicular area but impunctate. Middle basitarsus normal, parallel-sided, narrower than hind basitarsus. Hind tibia relatively narrow. Claws and tibial spurs normal. Wings with pterostigma about as broad as from inner margin of prestigma to wing margin, prestigma in length equals less than one-third of pterostigma.

Metasomal tergum 1 with minute round punctures separated mostly by three to five puncture widths or more, surface shiny, unshagreened. Terga 2-3 with slightly larger punctures separated mostly by two to four puncture widths except extremely narrow apical impunctate margins, surfaces shiny, unshagreened. Pygidial plate V-shaped with rounded apex. Sterna 2-5 with narrow apical impunctate areas, basal areas with punctures crowded apically, sparser basally, surfaces moderately dulled by reticular shagreening.

Vestiture: Generally black except metasomal terga 2-4 usually with apical fimbriae, broadly interrupted medially, of white to brown hairs. Pollen collecting hairs black, structurally as in subgeneric description.

MALE.—*Measurements and ratios*: N = 11; length, 8.0-10.0 mm; width, 2.0-2.5 mm; wing length, M = 4.15 ± 0.086 mm; FL/FW, M = 0.80 ± 0.011; FS1/FS2, M = 1.20 ± 0.26.

Integumental color: Black except as follows: clypeus yellow except small maculae below and mesad of tentorial pits and extreme lateral angles; parocular areas often with small yellow maculae below; wing membranes somewhat infumate; sterna and distitarsi slightly rufescent.



EXPLANATION OF FIGURES

Figs. 1-5. Terminalia of *Andrena vinnula* LaBerge and Hurd. 1-3. Genital capsule in dorsal, ventral, and lateral views. 4-5. Ventral views of sterna 7 and 8.

Structure: Antennae long, extending well beyond tegulae in repose; scape equals less than flagellar segment 1-3; flagellar segment 1 slightly longer than segment 2 and subequal to succeeding segments. Eye about three times as long as broad, inner margins parallel. Malar space as in female. Mandibles

decussate, in repose outer mandible extends about one-third its length beyond middle of labrum. Galea as in female. Maxillary palpus as in female but segments in ratio of about 1.2:1.4:1.0:1.3:1.0:1.0. Labial palpus as in female but segments in ratio of about 1.6:1.0:1.0:1.0. Labral process slightly reflexed, shallowly and broadly emarginate, subtrapezoidal in outline. Clypeus flat, not protruding beyond ends of eyes, with irregularly scattered punctures separated by two to six puncture widths, surface shiny, unshagreened. Supraclypeal area with minute punctures and coarse shagreening dulling surface. Genal area broader than eye, about as 3:2; sculptured as in female but unshagreened area next to eye broader. Vertex above lateral ocellus equals about one and one-half ocellar diameters, sculptured as in female. Face above antennal fossae as in female.

Pronotum with well-developed humeral angles, dorsoventral ridge extending down from angle rounded, furrow behind ridge shiny, unshagreened; sculpturing as in female. Mesoscutum, scutellum, and metanotum as in female. Propodeum as in female but lateral surfaces more coarsely shagreened. Episterna, wing venation, claws, and spurs as in female.

Metasomal terga sculptured as in female but tergum 5 similar to 4. Sterna 3-5 with apical areas with minute scattered punctures, basal areas with punctures coarser and slightly more abundant, surfaces shiny, with coarsely reticular, fine shagreening. Sternum 7 not reflexed apically, shiny, apical margin broadly emarginate.

Sternum 7 (Fig. 1) deeply emarginate with two acute long apical teeth; hairs sparse. Sternum 8 (Fig. 2) with apical portion shorter than basal, with apex broad, slightly emarginate, narrowly hyaline; hairs at apex not extending beyond hyaline margin; laterally, in middle of neck region, hairs longer, directed more laterad. Gonoforceps directed posteriorly, apex pointed in lateral view, with few short sparse hairs dorsally. Aedeagus strongly bent downwards, apex narrow, not expanded, in lateral view longer than gonoforceps (Figs. 3-5).

Vestiture: Black except as follows: clypeal hairs ochraceous to brown; lower episternal hairs pale ochraceous to brown; sternal hairs brown; outer surfaces hind tibiae and tarsi brown. Metasomal terga without apical fimbriae; sterna without distinct apical bands of long hairs, hairs generally short.

TYPE MATERIAL.—*Holotype male* and allotype female from 3 KILOMETERS SOUTH OF CHAPINGO, MÉXICO, MÉXICO, were collected by P. D. Hurd, 31 July 1962, on flowers of *Sicyos deppei*. Twenty female and ten male paratypes were collected at the same locality as the holotype from flowers of *Sicyos deppei* as follows: 3 ♀♀, 1 ♂, 31 July 1962, J. K. Drew; 1 ♀, 2 ♂♂, 31 July 1962, P. D. Hurd; 10 ♀♀, 3 ♂♂, 3 August 1962, P. D. Hurd; 1 ♀, 3 August 1962, J. K. Drew; 2 ♀♀, 2 ♂♂, 4 August 1962, P. D. Hurd; 3 ♀♀, 2 ♂♂, 4 August 1962, J. K. Drew. The holotype and allotype are in the collection of the California Academy of Sciences. Paratypes have been deposited in the collections of the University of California, Berkeley, the University of Nebraska, Lincoln, and the U. S. National Museum, Washington, D. C.

LITERATURE CITED

- HURD, P. D., JR., AND E. G. LINSLEY. 1964. The squash and gourd bees—genera *Peponapis* Robertson and *Xenoglossa* Smith—inhabiting America north of Mexico (Hymenoptera: Apoidea). *Hilgardia*, 35(15) : 375–477, 1 frontis., 18 figs.

**A Revised Key to the Species of *Elytroleptus*
With Notes on Variation and Geographical Distribution**

(Coleoptera : Cerambycidae)

J. A. CHEMSAK AND E. G. LINSLEY

University of California, Berkeley

Since the publication of recent taxonomic treatments of *Elytroleptus* and related lycid-like Cerambycidae (Linsley, 1961a, 1962a, 1962b), a significant amount of previously unstudied material from Mexico has been received which reveals that the type of polychromatism which has been recorded for *Elytroleptus apicalis* LeConte, *E. pallidus* (Thomson), *E. scabricollis* Bates, and *E. dichromaticus* Linsley, is far more widespread than published reports indicate. Since this polychromatism involves various combinations of *Lycus*-like, *Lycostomus*-like, and *Calopteron*-like coloration patterns, these data are of significance not only from the taxonomic viewpoint, but also in connection with studies of lycid mimicry, of which a number are currently underway and others have been published recently (e.g., Linsley, 1961b; Linsley, Eisner, and Klots, 1961; Eisner, Kafatos, and Linsley, 1962; Selander, Miller, and Mathieu, 1963; Emmel, 1965). For the latter reason, especially, we offer a revised key to species which takes this new information into account, together with notes on variation and distribution for certain of the species.

KEY TO THE SPECIES OF ELYTROLEPTUS

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|------|--|--------------------|
| 1. | Elytra gradually dilated from base or from in front of middle, quadricostate toward apex (small individuals of <i>ignitus</i> occasionally lack the fourth costa); larger species, 12–17 mm in length | 2 |
| | Elytra subparallel, at most slightly widened apically, tricostate throughout; smaller species, 7–12 mm in length | 7 |
| 2(1) | Elytra bicolored or concolorous yellow or rufo-testaceous | 3 |
| | Elytra entirely black; pronotum with surface densely clothed with appressed golden tomentum except for an oval black area on posterior half of disk and another black area on each side behind lateral angle. 13 mm. Mexico (Oaxaca) | <i>nigripennis</i> |
| 3(2) | Elytra concolorous yellow or rufo-testaceous or with apices black | 4 |
| | Elytra with a black antemedian band and apices broadly black with | |